NISTTech

Microfluidic Passive Sorting & Storage of Liquid Plugs using Capillary Force

Create libraries of microfluidic liquid plugs having arbitrary concentrations of chemicals

Description

This microfluidic chip can create libraries of liquid plugs with varying concentrations of chemicals. The chip has inlets to introduce at least four chemicals. Topographic restrictions create dead-end side microchannels that use capillary forces to store plugs of liquid. As the liquid flows through, it carries variable chemical concentrations that are stored sequentially in the side channels, yielding an array with a chemical gradient that varies within each microchannel and between microchannels. Complex chemical mixtures can be generated and stored for applications such as chemotaxis experiments under zero-flow conditions, or dispersed in immiscible liquid forming droplets for combinatorial experiments.

Images

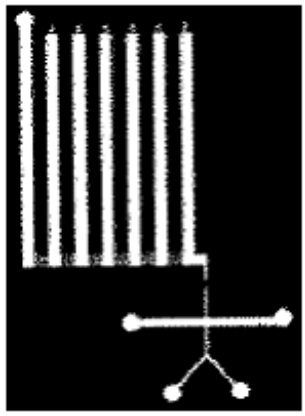

Image of device

Applications

- **Remote sampling**
  Environmental sampling of liquids in locations without a power source, for example, sampling source water at a remote location.
- **Liquid sample storage**
  Chronological sorting and storing liquid plugs for combinatorial analysis in a laboratory or in a zero gravity environment.
- **Zero-flow chemical mixtures**
  Generation and storage of complex chemical mixtures, for example, chemotaxis experiments under zero-flow conditions.

Advantages

- **Liquid sample storage for analysis**
  Permits an automated approach to store liquid in a deterministic way for combinatorial experiments.
- **No active valves required**
  Eliminates need for active valves by substituting use of capillary forces.

Abstract

The invention consists in a microfluidic device that without any actuator (no valves) is capable of sorting liquid plugs chronologically and store them in pockets. To do so, it takes advantage of the fact that capillary forces are greater on small hydrophobic channels than in large hydrophobic microchannels.

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References

- U.S. Abandonded Patent Application #20080295909
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Status of Availability

This technology is available in the public domain.

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